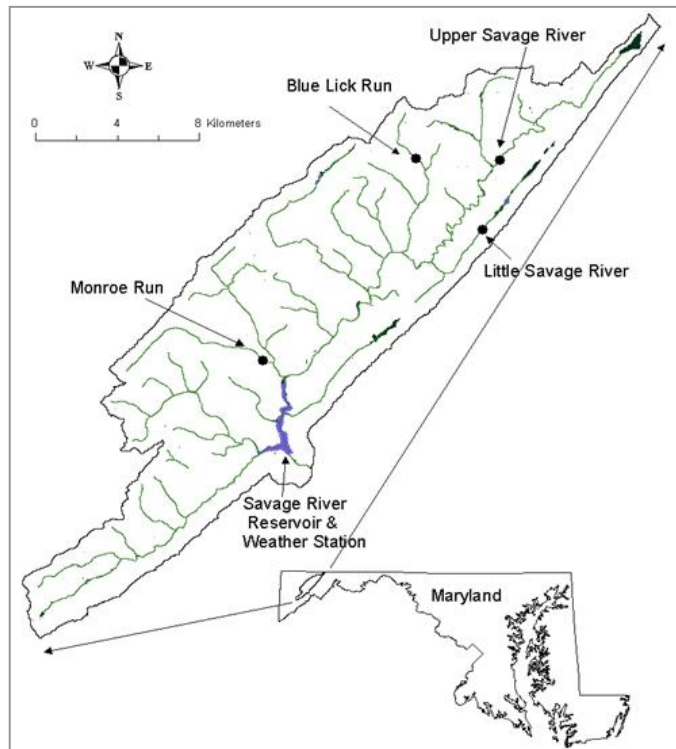


## *The Upper Savage River Brook Trout Special Management Area – A Decade of Learning!*

The native brook trout population in the upper Savage River (USR) system is a unique and special resource and is one of only a few brook trout populations south of New England that remains well connected. Ten major tributaries and several smaller tributaries feed into the



mainstem upper Savage River, with the vast majority of the land use in the watershed found in public forest land. These native trout still have the opportunity to move throughout the 100+ miles of connected streams, and many do, helping to produce some of the largest brook trout in Maryland! Many of these larger brook trout spend their winters in the mainstem of the USR where conditions are not as severe as in the smaller streams and where there is abundant food. As water temperatures increase in early summer, these fish will migrate up to 12 miles or more to spend their summers and early autumn in the smaller tributary streams where the water temperatures are less stressful. These small streams are also where the large fish will spawn to create future generations of brook trout. After spawning and the

stream temperatures have dropped, many individuals will once again migrate back to the mainstem USR, some to the exact spots where they spent the previous winter. Not all brook trout in the system are migratory; some of the trout in the individual tributary streams move very little, despite no barriers preventing movement.

Migratory brook trout were probably once common throughout their native range, but a suite of actions and events have gradually isolated most of these formerly connected populations. Land conversion from forest to other uses, past logging, increased stream temperatures, acid precipitation, and many other events have unintentionally restricted fish to ever smaller and less connected stream habitats. Most populations south of New England and Canada now exist as isolated populations in smaller tributary streams with fish unable to migrate to take advantage of changing environmental conditions to maximize their growth and survival. Supporting (and maintaining) connected streams is one of the most important features making the USR brook trout system so special.

Concerns over population downturns in the early 2000s (particularly where angler access was the easiest) pointed to needed changes in management. In response, angling regulations for all the tributaries and mainstem river upstream of the Savage River reservoir dam were changed. The

USR Zero Creel Limit Area restricts anglers to catch-and-release (for brook trout) using artificial lures only. These regulations were adopted because prior research suggested this would reduce total brook trout mortality yet still allow year-round recreational angling opportunity. In conjunction with the regulation change, DNR implemented a long-term monitoring program to compare across tributary populations and years as well as gauge the possible effects of fishing pressure.

The Brook Trout Program has been rigorously monitoring (annually) and conducting research on the USR brook trout population over the past decade and have learned many things that are guiding management here and elsewhere. Numerous scientific papers have been published from these efforts (Kazyak et al. 2013; Kazyak et al. 2014; Kazyak et al. 2015; Sell et al. 2014; Kazyak et al. 2016a; Kazyak et al. 2016b; Hilderbrand and Kazyak 2017) with more being written. The USR is recognized as a world class brook trout fishery, listed as one of *Trout Unlimited's 10 Special Places*, and is also known for

## Special Brook Trout Zero Creel Limit Area



Artwork by Dare Neely

### Special Regulations for the Upper Savage Brook Trout Management Area:

- 1) A Zero Creel and Possession Limit for Brook Trout has been established in this Area. Regulations apply to the mainstem Savage River upstream of Poplar Lick and tributaries, and to all tributaries of the Savage River Reservoir upstream of the Savage River dam.
- 2) Harvest of brook trout is prohibited. Harvest of brown and rainbow trout is allowed under general statewide regulations.
- 3) Angling can be done only with artificial lures (including artificial flies). Possession of any bait is prohibited.
- 4) Open season: January 1 through December 31, inclusive.



Inland Fisheries Management Division  
Contact Number: 410-260-8320



Special Regulations for the Upper Savage Brook Trout Management Area apply to the mainstem Savage River upstream of Poplar Lick and all tributaries of the Savage River Reservoir upstream of the Savage River dam.




**Catch—aPoacher Hotline**  
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DNR Western Region NR  
Police: 301-777-7774


its importance and contributions to fisheries science and management.


Some of the highlights of what we have learned from our efforts over the past 10 years include how the system functions and its future potential. We have observed that the USR brook trout population has recovered from its lower level and now appears to be stable to possibly increasing. Prior to monitoring, we had limited information about how the USR population behaved. We now know that reproductive success is the main factor influencing the USR population under the current regulation. A very dry autumn followed by a very wet spring results in almost no successful reproduction because the low flows in the fall limit availability and quality of spawning sites, while high flows in spring tend to scour and displace the eggs or very young fish. One year of poor

### Savage River Watershed


As natural gas extraction expands across the Central Appalachian region, that industrial-scale energy development is encroaching on public lands that are critically important for fishing and hunting. In this report, Trout Unlimited takes a deeper look into these public places, outlining the potential risks posed by gas drilling operations and providing recommendations from sportsmen and women that promote responsible energy development.







Show more about this Special Place, visit [tu.org/special-places](http://tu.org/special-places)



#### The Place

The Savage River watershed, located in western Maryland's Garrett County, is home to the state's premier brook trout fishery. Within the watershed there are over 120 miles of interconnected streams, and the highest density of brook trout in the state.

Flowing through old-growth hardwood forests and rhododendron thickets, the river is considered one of the best fly-fishing destinations in the region. No other trout fishery in Maryland possesses the abundance of wild trout in such wild surroundings. Downstream, the Savage River Reservoir is also a popular fishing destination, with numerous species of warm and coldwater fish, including bass and catfish.

More than half of the Savage River State Forest is located within the 74,000-acre watershed. It is one of the most popular public lands in the state and its 54,000 acres are home to white-tailed deer, wild turkey, black bear, beaver, mink, muskrat and river otter. A prime hunting area, a portion of the forest has been designated by the state as a wilderness area for its high conservation value and to protect the backcountry experience for hunters and anglers.

reproduction can be seen in lower numbers of adults 1 - 3 years later, and back-to-back years (or more) of poor reproduction can reduce the adult population to less than half of what we are used to seeing. This highlights the fisheries management value of protecting the older and larger fish in the population. Larger brook trout produce more and healthier eggs and choose the best spawning sites, increasing the likelihood of reproductive success. Protecting and keeping these large fish in the system ensures that there will be strong spawning stock present during and following those years with adverse environmental conditions. This also keeps larger fish available for anglers to enjoy a quality recreational fishery even during poor recruitment years.



Our long term monitoring has shown that while the adult population numbers have recovered, the biggest fish in the tributary streams in general have not gotten bigger. This suggests that the small streams we monitor either cannot support or cannot grow larger fish, despite substantially larger fish often sighted and caught in the mainstem of the USR. A possible reason for this is a lack of suitable habitat (such as woody debris) as a result of past land use practices, but this remains unknown and needs to be investigated. One surprising finding was that while historic fisheries work on Appalachian streams suggested that the brook trout life span was 2 - 3 years typically, we found brook trout living to at least 7 years in the USR system. This is a vital piece of information for fisheries management and conservation.

Finally, even though there has been some improvement in the number of large (>8") brook trout at the "easy" angler access sections (areas closest to access points) since the regulation was implemented, our long term monitoring work shows that these areas continue to have fewer adults and lower reproduction than do less accessible sections (where a long hike is necessary).



This remains a strong concern because it impacts angling opportunity, long term conservation potential, and suggests a direct connection between angler access and resource quality. While we do not have definitive answers as to why this is occurring, possible reasons include angler related mortality from the effects of higher angling pressure; habitat differences; physical disturbance to the stream bed, particularly damage to redds (nests) from being stepped on; and behavioral responses of fish to leave areas that have frequent

disturbances. Determining why areas with easy access are not as productive is a vital research need, as human populations encroach on brook trout habitat this will likely become an even more common management challenge.

In summary the brook trout population in the USR watershed will fluctuate due to natural environmental conditions, but currently supports a strong and thriving high quality brook trout fishery with immense angling popularity. The implementation of the special regulation has likely contributed, biologically and recreationally, to shielding the population during naturally occurring adverse environmental periods and maintaining large spawners in a high quality fishery even in down years. South of New England, these streams provide one of the only year-round fisheries where anglers can expect to catch 10" and larger brook trout, and up to 14"! The USR system remains one of the few fully connected brook trout systems in the mid-Atlantic region and its conservation value, regionally and nationally, because of its quality, connectedness, and likelihood for long term persistence cannot be overstated.





For more information visit the Brook Trout Program

Webpage at:

<http://dnr.maryland.gov/fisheries/Pages/brook-trout/index.aspx>, or contact Alan Heft

([alan.heft@maryland.gov](mailto:alan.heft@maryland.gov); 301-689-7107)

or Matt Sell ([matt.sell@maryland.gov](mailto:matt.sell@maryland.gov); 301-689-7168)



***Recent scientific papers written about the brook trout in the Savage river system:***

Hilderbrand, R.H., and D.C. Kazyak. 2017. Spatiotemporal stability patterns of Brook Trout abundance and implications for stream research and monitoring. *North American Journal of Fisheries Management* 37:353-362.

Kazyak, D.C., R.H. Hilderbrand, and A.E. Holloway. 2013. Rapid visual assessment to determine sex in brook trout. *North American Journal of Fisheries Management* 33:665-668.

Kazyak, D.C., and R.H. Hilderbrand. 2014. Growth variation in a Mid-Atlantic brook trout population. *Proceedings of Wild Trout XI. Supplement*:350-356.

Kazyak, D.C., R.H. Hilderbrand, S.R. Keller, M.C. Colaw, A.E. Holloway, R.P. Morgan, II, and T.L. King. 2015. Spatial structure of morphological and neutral genetic variation in brook trout *Salvelinus fontinalis*. *Transactions of the American Fisheries Society* 144:480-490.

Kazyak, D.C., M.T. Sell, R.H. Hilderbrand, A.A. Heft, and R.M. Cooper. 2016. A comparison of catchability and mortality with circle and J hooks for stream-dwelling Brook Trout *Salvelinus fontinalis*. *North American Journal of Fisheries Management* 36:259-266.

Kazyak, D.C., R.H. Hilderbrand, T.L. King, S.R. Keller, and V.E. Chhatre. 2016. Hiding in plain sight: A case for cryptic metapopulations in brook trout (*Salvelinus fontinalis*). *PLoS ONE* 11(1): e0146295. doi:10.1371/journal.pone.0146295.

Sell, M.T., A.A. Heft, D.C. Kazyak, R.H. Hilderbrand, and R.P. Morgan, II. 2014. Short term and seasonal movements of eastern brook trout, *Salvelinus fontinalis*, in the upper Savage River watershed, Garrett County, Maryland. *Proc. of Wild Trout XI. Supplement*:357-362.